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NOTICES FROM THE LICK OBSERVATORY.*

PREPARED BY MEMBERS OF THE STAFF.

THE OBSERVATORY INSTRUMENT-MAKING SHOPS.

A generation ago the astronomer ordered his telescope and expected it to meet all his requirements. This is no longer sufficient. The wonderful developments of our science call for special instruments to do special work, and the so-called universal instrument is out of date. The successful instrument must have the maximum efficiency in the problem to be solved. This is especially true in investigations along astrophysical lines. Every observatory of our class requires an instrument-making shop near at hand. This need is very pressing here, on account of our unusual isolation.

The shops at the Lick Observatory were entirely inadequate for their purpose. Up to one year ago, the equipment consisted of two small antiquated foot-power lathes, an antiquated hand-drill, files, etc., and the carpenter's hand-tools. The quantity of construction possible by their means was small, many vital parts of the instruments could not be made at all, vexatious delays in construction elsewhere were frequent, and our plans were rapidly falling in arrears to such an extent that the efficiency of the Observatory suffered severely. I therefore decided to devote the first available funds to the improvement of the machine-shops.

The carpenter-shop, paint-shop, and forge occupied adjoining rooms in a small brick building near the great dome, constructed by the Lick Trust. The paint-shop was removed to a distant isolated building, both to diminish risks from fire and to increase the space in the carpenter-shop. The inside walls of the forge-room were likewise removed. The resulting carpenter-shop is 20 × 26 feet inside. An addition to this shop was built by the Observatory workmen in 1891 (inside dimensions, 25 x 33 feet) from brick left in the orignal Lick Trust kilns. This room had been used for storage, for the metal-working shop, and for a steam boiler and engine employed in charging storage-batteries and in sawing the observatory wood. The engine and wood-saw were removed to a small brick building in 1901, to the east of the barn, and storage space has been found elsewhere. The rearranged room admirably meets the requirements of a complete instrument-making shop on the small scale desired. A Foos four-horse-power gasoline engine was installed in the shop in place of the steam engine. It drives the metal- and wood-working machines described below. It has the usual advantages of such an engine: it is always ready to start without waiting for steam to rise; the expense of fuel is small; it does not need the attention of a fireman; and it does not heat the work-room unduly.

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* Lick Astronomical Department of the University of California.

A Brown & Sharpe universal milling machine, a Brown & Sharpe tool-grinding machine, a modern wood-turning lathe, a wood rip-saw, and an emery grinder were purchased in 1901. The old foot-lathes were modified to adapt them to power, and it is planned to convert one of them into a grinding machine. The necessary shafting, pulleys, belting, attachments, and small tools were likewise provided. The gasoline engine also drives the dynamo.

The thoughtful generosity of Mrs. HEARST has enabled me to arrange for the completion of the shops without the delay that I feared must occur, by purchasing a modern lathe of fourteen-inch swing and eight-foot bed, with all necessary attachments; a power drill; a power saw for cutting metal; a cross-cut saw for wood; a wood-shaper; a small tempering and reducing furnace; and many minor tools.

It is planned to have all heavy work done elsewhere. For this reason, metal-shapers and other similar tools have been omitted from the equipment.

The press of work resulting from the remounting of the Crossley reflector, from the reconstruction of the Mills spectrograph, for which Mr. MILLS has provided funds, and from the construction of a modern one-prism spectrograph from the Draper Fund of the National Academy of Sciences, has made it necessary to employ temporarily a second instrument-maker, with salary paid from the two funds mentioned.

W. W. CAMPBELL.